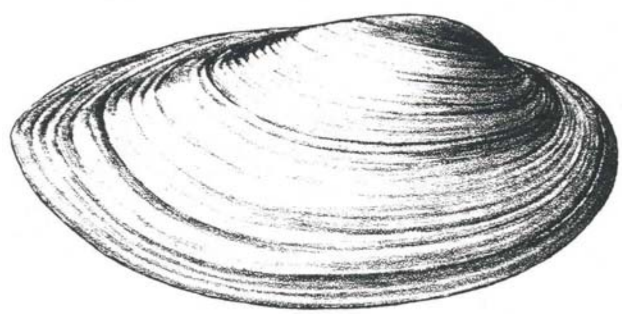
Conservation Assessment

The Yellow Sandshell, *Lampsilis teres* (Rafinesque, 1820)



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Executive Summary:

The Yellow Sandshell, *Lampsilis teres* (Rafinesque, 1820) is a medium sized mussel that inhabits a variety of habitat types but is usually be found along the banks of muddy or silty rivers. *Lampsilis teres* can be distinguished from other species of *Lampsilis* by its elongate, yellow shell and its lack of any rays on the shell surface. The historical range of this species appears to have included the Mississippi River drainage from South Dakota south to northern Mexico, and the Gulf drainages from the Withlacoochee River in Florida west to the Rio Grande. *Lampsilis teres* is not listed by the U. S. Fish and Wildlife Service as a threatened or endangered species; although it is listed by several mid-western states.

Lampsilis teres is a dioecious species, and its brooding habit is bradytictic: spawning occurs in the summer, and the larvae are released the following spring. A variety of fish hosts have been identified for this species. Factors considered detrimental to the persistence of this species are non-native species such as zebra mussels, and pollution. Because of the wide range of this species and the existence of named sub-species, additional information regarding geographic, life history and genetic variation in *L. teres* should be obtained prior to initiation of captive breeding and re-introduction or translocation projects.

Lampsilis teres (Rafinesque, 1820) Yellow Sandshell

Synonomy:

Elliptio teres Rafinseque, 1820; Rafinesque, 1820:321
Unio teres (Rafinesque, 1820); Say, 1834: no pagination
Lampsilis (*Ligumia*) *teres* (Rafinesque, 1820); Frierson, 1927:70
Lampsilis teres teres (Rafinesque, 1820); Haas, 1969a:431
Lampsilis teres teres (Rafinesque, 1820); Oesch, 1984:207-209
Unio anodontoides Lea, 1834; Lea, 1834:81, pl. 8, fig. 11
Margarita (*Unio*) *anodontoides* (Lea, 1834); Lea, 1836, 35
Margaron (*Unio*) *anodontoides* (Lea, 1834); Lea, 1852c:36
Lampsilis teres anodontoides (Lea, 1834); Oesch, 1984:209-212
Lampsilis anodontoides (Lea, 1834); Baker, 1898:100, pl.10, fig. 1
Lampsilis anodontoides anodontoides(Lea, 1834); Murray and Leonard, 1962:143
Lampsilis anodontoides form *anodontoides*(Lea, 1834); Valentine and Stansbery, 1971:30
Unio oriens Lea, 1831; Sowerby, 1868: pl. 63, fig. 314 [mis-identification]
Unio floridensis Lea, 1852; Lea, 1852b:274, pl. 21, fig. 31
Margaron (*Unio*) *floridensis* (Lea, 1852); Lea 1852c:39
Lampsilis (*Eurynia*) *anodontoides* var. *floridensis* (Lea, 1852); Simpson, 1900a:544
Lampsilis (*Ligumia*) *teres floridensis* (Lea, 1852), Frierson, 1927:70
Lampsilis anodontoides floridensis(Lea, 1852), Clench and Turner, 1956:201, pl. 3, fig. 1
Ligumia teres floridensis (Lea, 1852); Haas, 1969a:432
Lampsilis fallaciosus Smith, 1899; Smith, 1899:291, pl.79
Lampsilis (*Eurynia*) *fallaciosa* Smith, 1899; Simpson, 1900a:544
Lampsilis (*Ligumia*) *teres fallaciosa* Smith, 1899; Frierson, 1927, 70
Lampsilis anodontoides fallaciosa Smith, 1899; Grier and Mueller, 1926:18
Lampsilis anodontoides form *fallaciosa* Smith, 1899; Valentine and Stansbery, 1971:30

Type Locality: Mississippi, Alabama, and Ohio Rivers.

Distribution:

Mississippi River drainage north to South Dakota, and south to northern Mexico. Gulf drainages from the Withlacoochee River in Florida west to the Rio Grande (Baker, 1928).

Description:

A medium to large sized mussel, the shells are elongated, thick and moderately to greatly inflated. The beaks are anterior to the middle of the shell and are only slightly elevated above the hinge-line. The ventral edge of the shell is mostly straight. In females the ventral edge is upturned sharply towards the posterior of the shell. The posterior end is pointed and the anterior end is rounded. The periostracum ranges from various shades of yellow to light brown, typically lacking rays. The surface is smooth except for growth lines. Nacre is white, although the beak cavity is sometimes faintly washed in pink or cream. The glochidia are described by Hoggarth, (1999) as subspatulate in shape, and exterior valve surface as "malleated and pitted."

Dorsal alae are present, and lanceolate micropoints are present on the proximal half of the ventral valve edge. The average length and height of a glochidium is 191 and 258µm respectively.

Life History and Ecology:

The Yellow Sandshell has been reported from a variety of habitats including small streams to large rivers as well as oxbow lakes. Water conditions range from clear to turbid and substrates vary from rocky to muddy (Murray and Leonard, 1962; Buchanan, 1980; Oesch, 1984) to sand and silt (Brim Box and Williams, 2000). Early malacologists noted differences in shell morphology of named forms which corresponded with habitat: *L. t. fallaciosa* prefers muddy streams and pond-like areas, whereas *L. t. anodontoides* inhabits swifter streams in gravel and cobble (Ortmann, 1926a), however more recent observations (Murray and Leonard, 1962; Parmalee and Bogan, 1998) indicate these generalizations may not hold. Baker (1928) describes this species as bradytictic, and females have been found with glochidia from May through November across Texas (Howells, 1996). Eleven species have been determined to be suitable hosts based on natural infestations: *Lepsisosteus spatula*, *L. osseus*, *L. platostomus*, *Scaphirhynchus platorynchus*, *Lepomis auritus*, *L. cyanellus*, *L. gulosus*, *L. humilis*, *Pomoxis annularis*, *P. nigromaculatus*, and *Perca flavescens* (Lefevre and Curtis, 1912; Surber, 1913; Howard, 1914; Wilson, 1916; Coker et al. 1921; Barney, 1922; Howard and Anson, 1922; Arey, 1932; Jones, 1950; Prentice, 1994). Female *L. teres* have been observed to display a dark, un-ornamented mantle flap. These displays have only been observed at night in shallow water.

<u>Status</u>:

Lampsilis teres was listed as currently stable by Williams et al. (1993). This species is not considered threatened or endangered by the U. S. Fish and Wildlife Service, although it is listed as state endangered by Ohio, Minnesota, and Wisconsin. Indiana considers this species imperiled with the state. Examination of museum record indicate that it has been collected in many states within the last ten years, although several states the most recent collections are within the last twenty years or older. This could be due to collection bias, as often more common species are overlooked by collectors and can be underrepresented in collections. The wide range of habitat types suitable for *L. teres* imply that this species should continue to thrive in impounded rivers as well as free flowing streams, although its listing by several states indicates careful monitoring of its status is warranted. Suitable host fishes are also common and are also often found in habitats preferred by *L. teres*. This species was once an important species for the shell-button industry (Howells, 1996), and may still be harvested in some states.

<u>Limiting Factors</u>:

Approximately 67% of freshwater mussel species are vulnerable to extinction or are already extinct (National Native Mussel Conservation Committee, 1998). Factors implicated in the decline of freshwater bivalves include the destruction of habitat by the creation of impoundments, siltation, gravel mining, and channel modification; pollution and the introduction of non-native species such as the Asiatic clam and the Zebra Mussel.

<u>Zebra Mussels</u>:

The introduction of consequent spread of *Dreissena polymorpha* in the mid to late 1980's has severely impacted native mussel populations in the Lower Great Lakes region (Schlosser et al. 1996). Adverse effects on unionid mussels stem primarily from the attachment of *D. polymorpha* the valves native mussels. In sufficient numbers, *D. polymorpha* can interfere with feeding, respiration, excretion, and locomotion (Haag et al. 1993, Baker and Hornbach 1997). It has been estimated that the introduction of *D. polymorpha* into the Mississippi River basin has increased the extinction rates of native freshwater mussels from 1.2% of species per decade to 12% per decade.

Native mussels have shown differential sensitivity to *D. polymorpha* infestations. Mackie et al. (2000) stated that smaller species with specific substrate requirements and few hosts and were long-term brooders were more susceptible than larger species with many hosts, that were short-term brooders. *Lampsilis teres* is a long-term brooder and is often found in sloughs and backwaters where *D. polymorpha* can reach high densities.

<u>Siltation</u>:

Accumulation of sediments has long been implicated in the decline of native mussels. Fine sediments can adversely affect mussels in several ways they can interfere with respiration, feeding efficiency by clogging gills and overloading cilia that sort food. It can reduce the supply of food by interfering with photosynthesis. Heavy sediment loads can also smother juvenile mussels. In addition, sedimentation can indirectly affect mussels by affecting their host fishes (Brim-Box and Mossa, 1999). Strayer and Fetterman (1999) have suggested that fine sediments may be more harmful to mussels in lower gradient streams where sediments can accumulate. Because of its tolerance for muddy silty habitats *L. teres* is probably less sensitive to siltation than many upland species, although the aforementioned impacts on juveniles and feeding still apply to this species.

<u>Pollution</u>:

Chemical pollution from domestic, agricultural, and domestic sources were responsible for the localized extinctions of native mussels in North America throughout the 20th century (Baker, 1928, Bogan, 1993). According to Neves et al. (1997) the eutrophication of rivers was a major source of unionid decline in the 1980's, while Havlik and Marking (1987) showed that many types of industrial and domestic substances: heavy metals, pesticides, ammonia, and crude oil were toxic to mussels. The listing of *L. teres* as endangered in several states where agriculture comprises a significant component of land use may reflect poor water quality due to agricultural practices in those states.

Dams/Impoundments:

Impoundments whether for navigational purposes or for the generation of power can dramatically affect the habitat of freshwater mussels. Impoundments alter flow, temperature, dissolved oxygen, substrate composition (Bogan, 1993). In addition, they can isolate freshwater mussels from their host fishes thereby disrupting the reproductive cycle. Changes in water temperature can suppress or alter the reproductive cycle and delay maturation of glochidia and juvenile mussels (Fuller, 1974, Layzer et al. 1993). *Lampsilis teres* should be relatively unaffected by impoundments as it seems to tolerate more lentic conditions.

Population Biology and Viability:

There are three named forms of *L. teres*, not all of which are consistently recognized. As stated earlier the forms *L. t. anodontoides* and *L. t. fallaciosus* have typically been segregated by habitat type and subtle conchological differences. A third form *L. t. floridensis* was described by Isaac Lea from the Choctawhatchee River and was described by Clench and Turner (1956) as differing from typical *L. teres* by being smaller and thinner shelled and by having a depressed umbo. No published genetic surveys have been performed on this species to test the validity of these forms as natural taxa.

Special Significance Of The Species:

Lampsilis teres is the most widely distributed member of the genus *Lampsilis*, and with the exception of *Glebula rotunda* is the only species of mussel, based on natural infestations that is known to utilize gar as a host fish, and the only mussel observed displaying at night. The combination of a widespread distribution, the presence of a simple mantle flap and the utilization of a primitive group of fishes as a host all point to the possibility that *L. teres* is a basal member of the genus *Lampsilis*.

Management Recommendations:

Plans for the conservation of North American freshwater mussels have generally taken one of two approaches: 1.) the preservation of existing populations and allow the mussels to re-invade historical ranges naturally and 2.) to actively expand the existing ranges by re-introducing mussels through translocation from "healthy" populations or from captive rearing programs (NNMCC, 1998). The second strategy is the more pro-active, and may ultimately prove to be effective, however several important factors should not be over-looked. Before translocations or re-introductions occur it should be established that conditions at the re-introduction site are suitable for the survival of mussels. Mussel translocation projects have had mixed success (Sheehan et al. 1989, Cope and Waller, 1995). Re-introducing mussels into still contaminated or otherwise un-inhabitable habitat is a waste of resources and can confound attempts to obtain unbiased estimates of the survival of species after re-introduction. Additionally, the genetic variation across and within populations should be assessed prior to the initiation of a reintroduction/translocation scheme (Lydeard and Roe, 1998). Evaluation of the genetic variation is crucial to establishing a captive breeding program that maintains the maximal amount of variation possible and avoid excessive inbreeding (Templeton and Read, 1984) or outbreeding depression (Avise and Hamrick, 1996).

Additional information about the life-history variation across populations of *L. teres* would also prove important to assess prior to initiating a translocation project. An examination of intraspecific genetic variation of this species would be valuable for determining whether or not the named forms of *L. teres* represented distinct species or were merely ecophenotypes.

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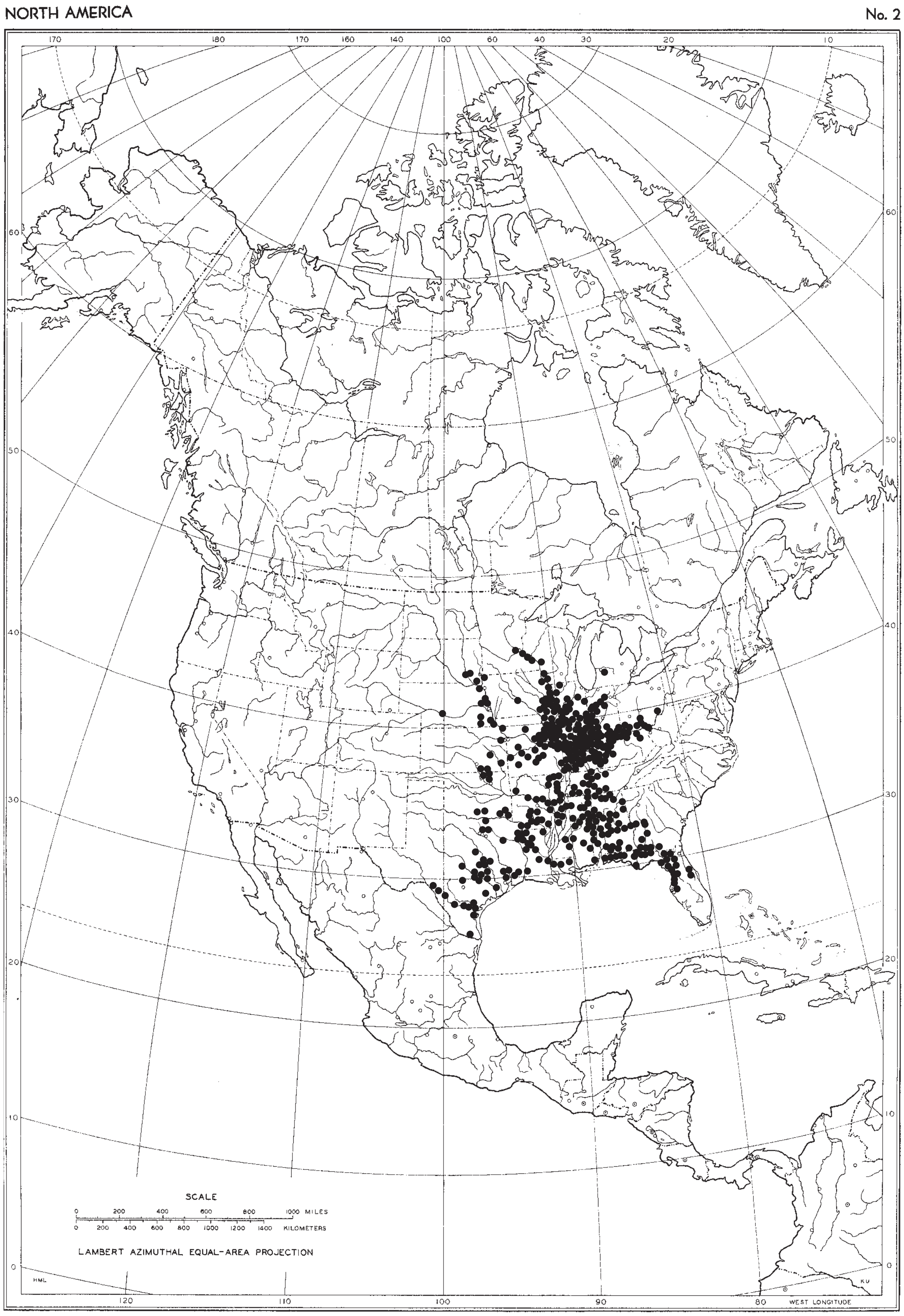
Figure 1. Distribution of *Lampsilis teres* by county based on museum records.


NORTH AMERICA
No. 2
SCALE
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LAMBERT AZIMUTHAL EQUAL-AREA PROJECTION
WEST LONGITUDE
Prepared by Henry M. Leppard